Weather and Climate Summary and Forecast
September 2021 Report

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September 2, 2021

Summary:

- West Coast states were warmer than average in August[1] while inland areas of the west were slightly cooler.
- Some rain for the southwest and Rockies, but extremely dry conditions continued elsewhere in the west.
- Monsoon rains have slightly lowered drought levels in the southwest, however, both short- and long-term indicators point to drought conditions likely continuing into fall for much of the western US, with the only exceptions being some improvement in the northern PNW and southwest.
- A pleasant start to September is likely followed by a moderate warm-up through mid-month, but no extreme heat is evident in the forecast. Models are hinting at a circulation change over the North Pacific, likely ushering in our normal start to fall low-pressure areas dropping southward beginning mid-month. No indication of these being anything other than minor rainmakers and likely to leave all but the PNW and extreme northern California out of the mix, but worth watching as harvest continues.
- Some talk about the tropics shifting to La Niña in the fall and early winter, but ENSO-neutral conditions continue for now. The North Pacific remains in the negative phase of the PDO. While both tilt the odds to a warm and generally dry end of the vintage, the forecast for the start to the fall and winter rainy season is less firm at this point. La Niña conditions would indicate a good chance for a colder/wetter PNW, but cooler and drier California. Neutral conditions are less clear to the general forecasting capabilities for the western US. Stay tuned.

While not as warm as July, August continued the generally warm conditions experienced this summer, especially in Washington, Oregon, and California (Figure 1). Monsoon flow from the southwest and a few low-pressure areas dropping out of Canada kept temperatures closer to average or below average for much of inland areas of the western US. Temperatures were 2-5°F above average for the month in west coast states, yet coastal zones in Washington, Oregon, the Bay Area, and southern California continued to experience near average temperatures due to enhanced marine layers from cooler than normal ocean temperatures in the coastal zone. During the month of August, most of the eastern US was much warmer than average, with Texas and portions of the Gulf Coast closer to average (not shown). The monsoon flow and northern systems brought precipitation to the southwest and Rockies (Figure 1), otherwise, dry conditions prevailed in the west. For the rest of the country, precipitation was very spatially variable with no significant patterns standing out (not shown).

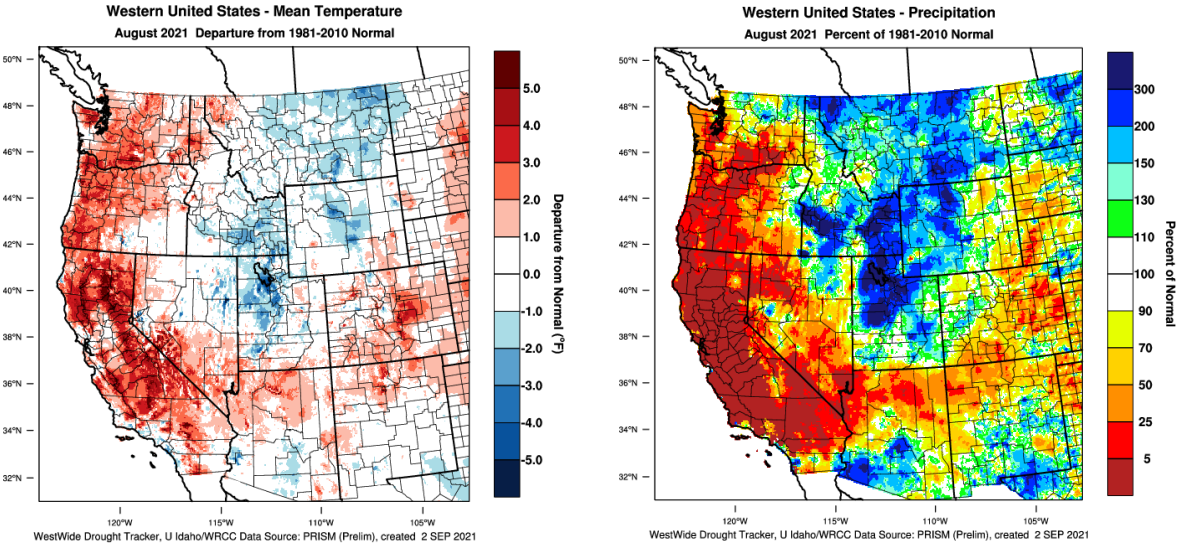

Figure 1 – Western US August 2021 temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

[1] Note that all references to normal or averages in this report are to the 1981-2010 climate normal for each weather/climate parameter unless stated otherwise. Also, note that the 1991-2020 climate normals are starting to become available across reporting agencies and will be used in this report when possible.

Through August, year-to-date temperatures across the western US are running above average (Figure 2), although coastal zones remain closer to average due to cool SSTs offshore. The Front Range of the Rockies south into the southern Plains and Texas remains cooler than average year-to-date (Figure 2), while the southeast has been near average and Florida, New England, the northern Plains, and the Great Lakes have been warmer than average (not shown). Precipitation amounts year-to-date in the western US remain largely 90% or less of normal, with substantial areas at 45% or less year-to-date (Figure 2). Monsoon flow has helped portions of the southwest recover somewhat, a welcomed sight after a couple of years of little to no monsoon effect in the region. Even with some precipitation in August, dry conditions have remained for most everywhere in the west and continue to reflect ongoing and projected drought concerns (see Drought section below). For the rest of the country, year-to-date dry conditions continue across the northern Plains, portions of the Great Lakes, and into extreme northern New England, while the central portion of the country and southeast has largely been near average to wetter than average for the year (not shown).

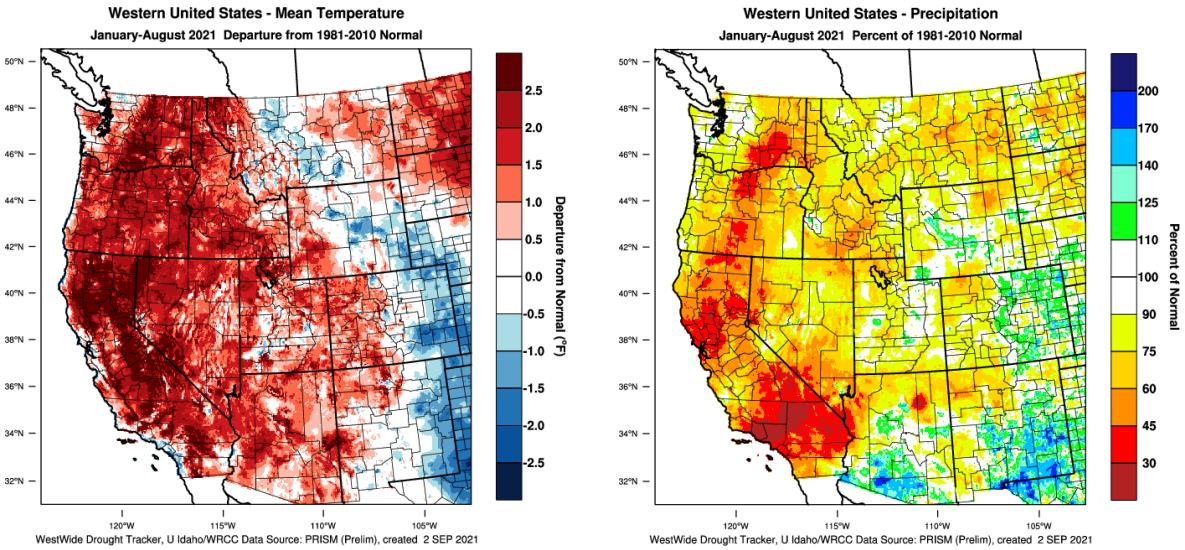

Figure 2 – Western US year to date (January-August 2021) temperature departure from normal (left) and percent of normal precipitation (right; images from WestWide Drought Tracker, Western Region Climate Center; University of Idaho).

Growing degree-days (GDDs) for the western US from March through August show accumulations slightly to modestly above average in most of the western regions of California, Oregon, Washington, and Idaho (Figure 3; note that this data is now referenced to the 1991-2020 climate normals). Coastal zones around the Bay Area southward in California have been closer to average or slightly below average due to cooler coastal ocean temperatures driving stronger marine layers. Western US states continue running 5-20 days ahead of normal GDD accumulations, while the coastal zones in central to southern California are near average to up to ten days behind.

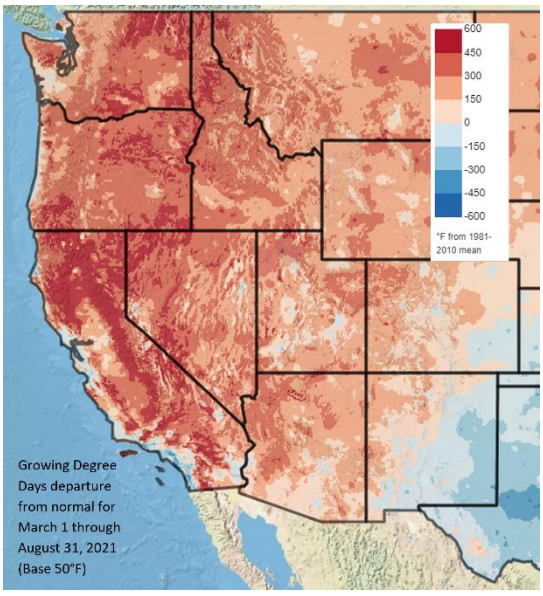

Figure 3 – Western US March through August 2021 growing degree-days (image from Climate Impacts Research Consortium, University of Idaho). Note that this data is now referenced to the 1991-2020 climate normals.

With the 2021 vintage harvest starting for many, four locations that I have tracked for many years in wine regions in Oregon remain substantially above the 1981-2010 normals for growing degree-days (19-33%). During 2004-2020 these same locations are 10-17% above the average. Compared to the 2015 vintage, one of the warmest years on record in Oregon, Medford remains above the 2015 vintage while Roseburg and McMinnville are now within a few percent of 2015, and Milton-Freewater remains approximately 8% below the GDD accumulated during the 2015 vintage (Figure 4). Compared to the 2020 vintage, the four locations are currently 6 to 19% above at this point.

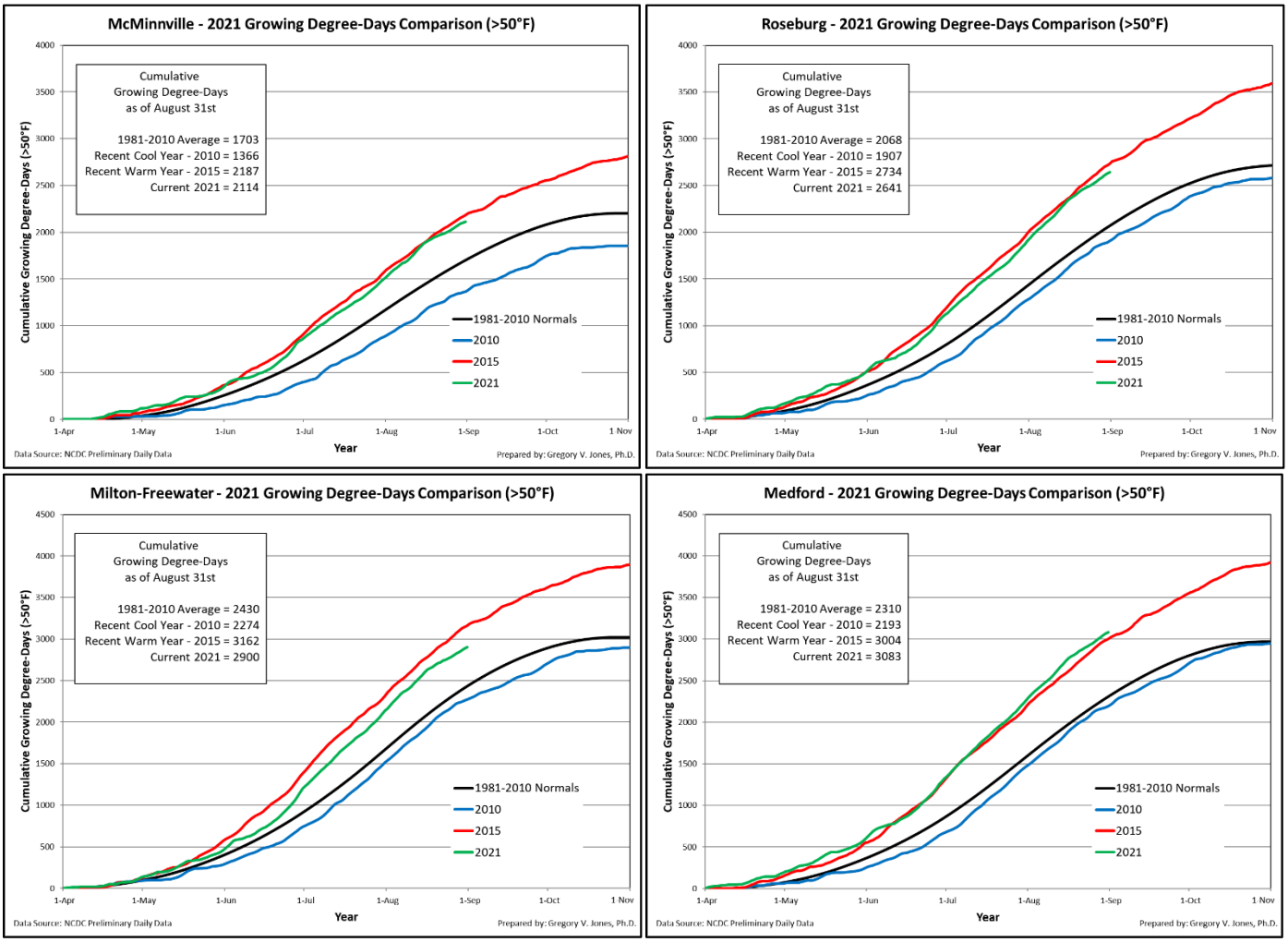

Figure 4 – Cumulative growing degree-days (base 50°F, no upper cut-off) for McMinnville, Roseburg, Milton-Freewater, and Medford, Oregon. Comparisons between the current year (2021) and a recent cool year (2010), a recent warm year (2015), and the 1981-2010 climate normals are shown (NCDC preliminary daily data).

Drought Watch – With the dry conditions continuing throughout the west, over 98% of the region remains in some level of drought (Figure 5). The area in the highest levels of drought, extreme and exceptional, have shown some improvement from last month, dropping from 65% to 60%. This improvement has been due to monsoon flow bringing moisture into the southwest and portions of the Rockies. Drought zones remain extended across the northern Plains and across to the western Great Lakes, while much of the central portion of the US, Gulf Coast, southeast, and northeast are largely drought-free currently. Both short- and long-term drought indicators along with the seasonal outlook (Figure 5, right panel) point to the western US being highly likely to continue dry conditions into fall and early winter. Some improvement along the coastal zones of northern Oregon and the Olympics and northern Cascades is forecast into the fall and first half of winter. Continued monsoon-like flow in the southwest will likely improve drought conditions there, as will precipitation forecasted across the northern Plains (Figure 5).

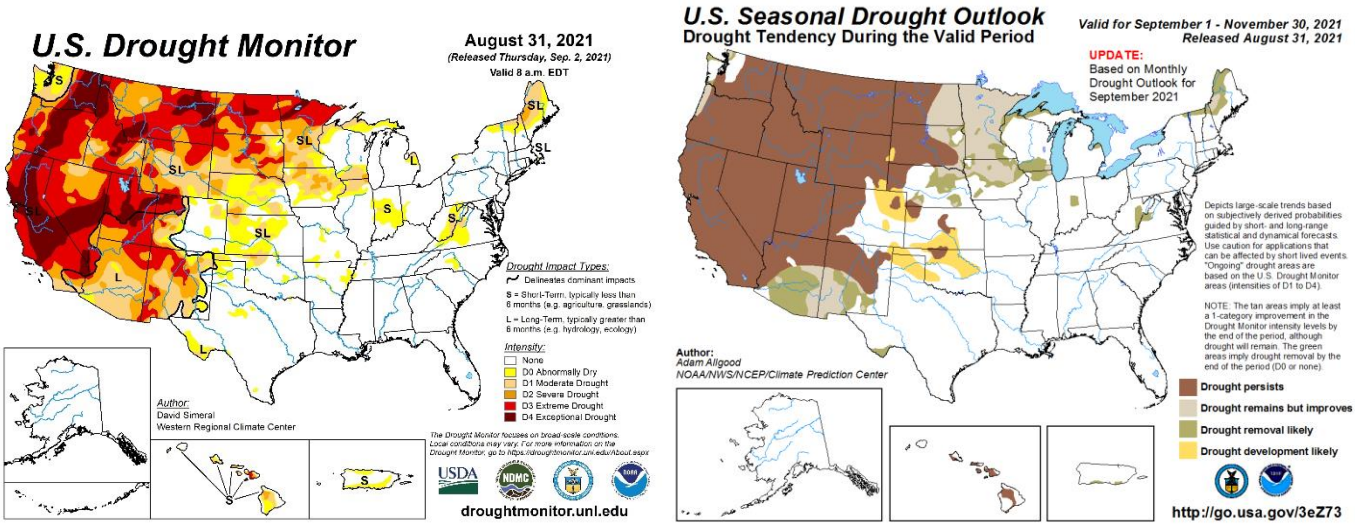

Figure 5 – Current US Drought Monitor and seasonal drought outlook.

ENSO Watch – While the Tropical Pacific remains in a neutral state (Figure 6), there is some evidence and discussion concerning a developing La Niña this fall and into winter. As of mid-August, the Climate Prediction Center (CPC) reported that SSTs in the east-central Pacific have dropped to slightly below average but remaining within neutral ENSO conditions, and patterns in all key atmospheric variables are consistent with neutral ENSO conditions as well. Model forecasts are still forecasting ENSO-neutral through boreal summer but are now indicating a greater likelihood of La Niña developing afterward. The official CPC/IRI outlook is a little more conservative on this forecast, staying with ENSO-neutral followed by some cooling to close to La Niña conditions, but transitioning back to neutral during winter. ENSO-neutral to marginal La Niña conditions in fall and winter are not very telling on our winter forecast. Correlations would say that the PNW is likely to see near average to slightly wetter winter, while California will likely be near average to slightly drier during the upcoming winter. However, things could change if La Niña develops further than forecast … stay tuned.

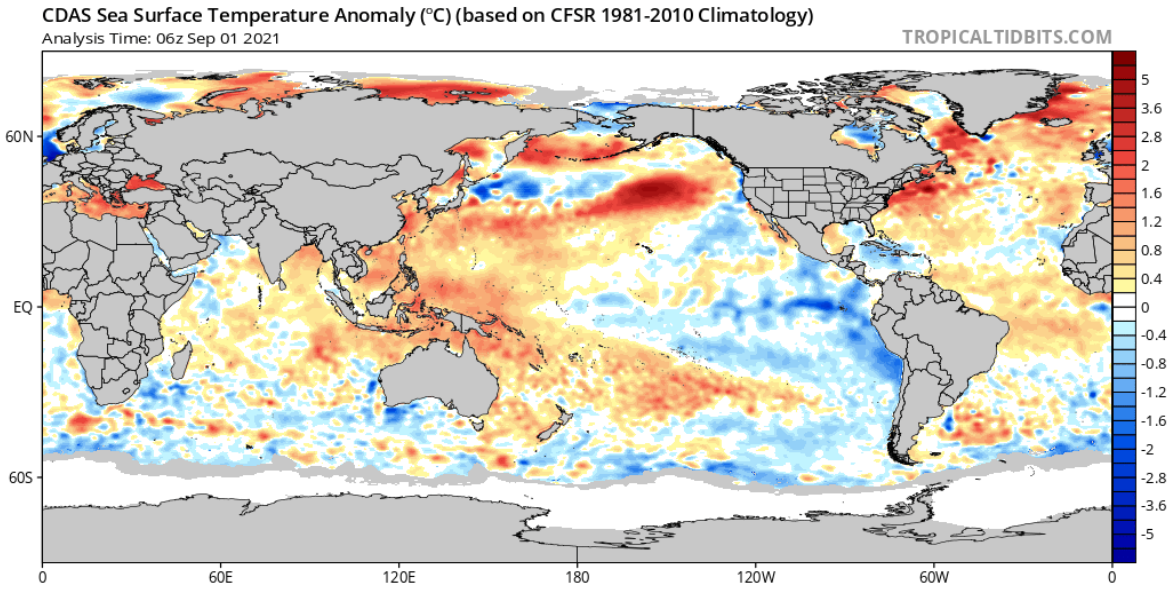

Figure 6 – Global sea surface temperatures (°C) for the period ending September 1, 2021 (image from Tropicaltibits.com).

North Pacific Watch – Sea surface temperatures in the North Pacific continue to show a similar pattern of the past few months with broad-scale warmer than average SSTs (Figure 6), cooler than average coastal SSTs along the west coast, and cooler than average SSTs extending southwest toward Hawaii and the tropics. These conditions continue to place the Pacific Decadal Oscillation slightly more to the negative phase, but still close to the neutral range. Surface

temperatures in the center of the Gulf of Alaska have warmed slightly, but the magnitude and extent have declined (Figure 6). There appears to be continued support from the North Pacific in our warm and dry summer, although the cooler coastal waters have continued to maintain strong marine layers. With the Topics likely to stay ENSO-neutral or mild La Niña into winter, shifts in the PDO will likely continue to play an outsized role in our winter weather … stay tuned.

Forecast Periods:

Next 5 Days: Trending warmer through the weekend for most of the western US with mid to high 80s and low 90s. The usual inland areas will likely see a day or two over 100. No rain in sight for points south of the Puget Sound, with a slight chance for the Seattle area and the northern Cascades.

6-10 Day (valid September 7-11): Temperatures should remain seasonal for most of the western US with the Four Corners region and the Rockies likely to see the warmest conditions during this forecast period. Models are hinting at a potential shift in circulation across the midlatitudes bringing low-pressure areas into the region and just enough to bring increased chances of precipitation to the west. It is not likely to bring soaking rains, but the chances do go up toward mid-month and the spatial probabilities are higher in the PNW than for areas south and inland. As the west stays warm, the east US cools off to some degree and is expected to see average to below-average precipitation during this forecast period.

8-14 Day (valid September 9-15): The flow shift continues into this forecast period, tilting the odds to a slight cool down and increased chances for precipitation in the PNW and northern Rockies mid-month. California is forecast to see near average temperatures and likely not to get much in the way of precipitation during this forecast period. The core of the heat in the west shifts eastward to the southern Plains and extending up into the Great Lakes, with the Appalachian Mountains into New England likely to see below average-to-average temperatures for this time of the year. Precipitation across the rest of the country is forecast to be below average through mid-month.

30 Day (valid September 1-30): The current forecast is pointing to the western US likely seeing a generally warmer than average month. No extreme heat is forecast at this point, just overall slightly warmer than average. The forecast for precipitation for September is tilting the odds to a drier than normal month for the PNW. The PNW gets rainfall during September, and the forecast expects some, this is just saying we may not see as much as normal. The southwest is forecast to see some continued monsoon flow, which may extend into southern California, therefore the forecast for California is calling for equal chances of slightly above to slightly below precipitation for the month. The rest of the US is largely forecast to see a September near average in terms of temperatures and precipitation, except the south and up into the northeast which has tropical systems that are likely to elevate their monthly totals.

90 Day (valid September-October-November): As we head into the end of the growing season and start of fall, the general forecast is holding to a broadly warmer than average three-month period for the west and most of the rest of the country (Figure 7). Areas along the northern border of the PNW and Canada are forecast to have an equal chance of seeing slightly above to slightly below temperatures as is the central Gulf Coast. For the 90-day period, the precipitation forecast is also hinting at equal chances for most of the country, except for the forecast for a drier start to the fall over the Four Corners region and a possible wetter start to the fall in the far western PNW and along the coast of British Columbia.

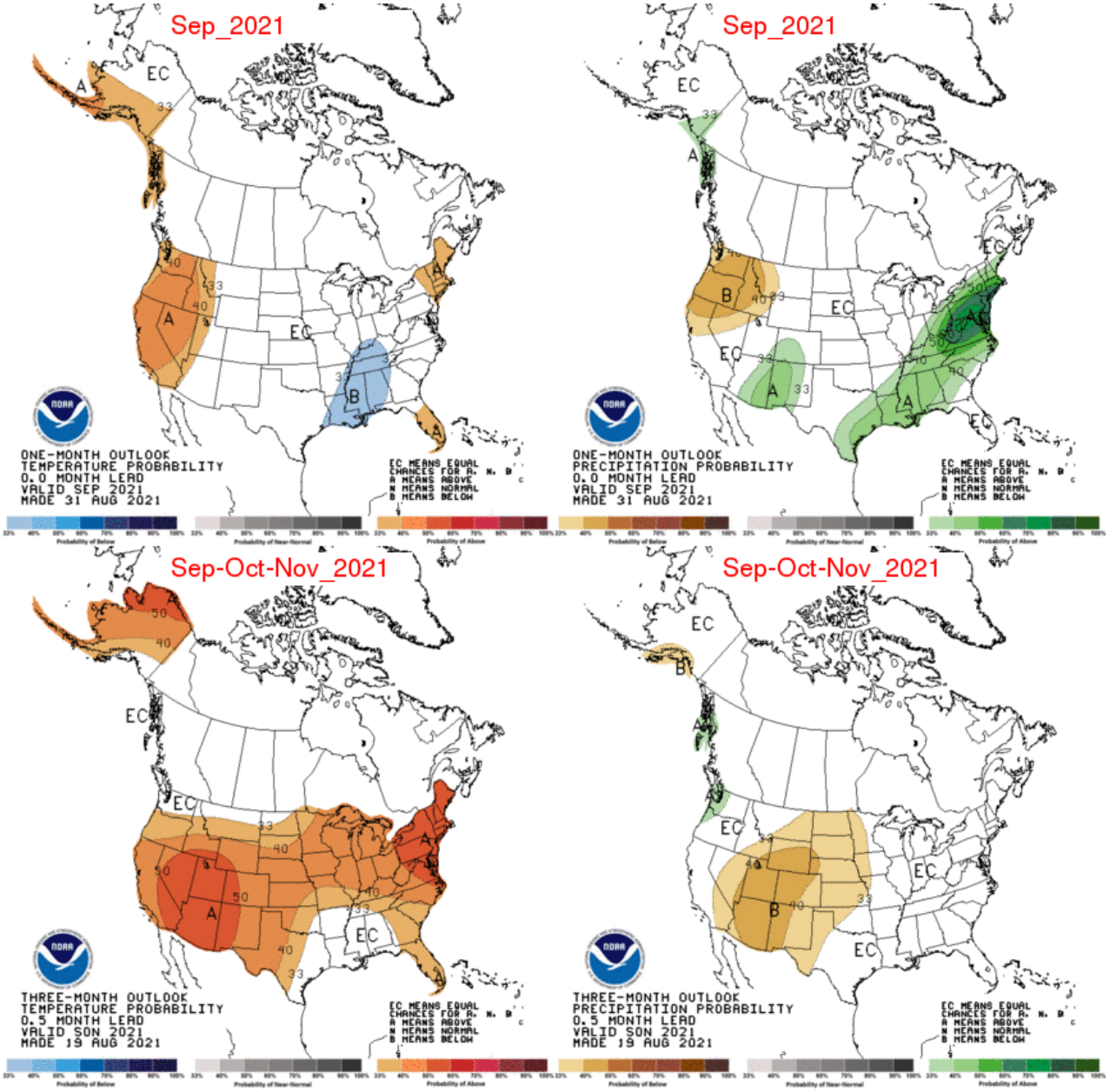

Figure 7 – Temperature (left panel) and precipitation (right panel) outlooks for the month of September (top panel) and September, October, and November (bottom panel) (Climate Prediction Center, climate.gov).